Claims

1. A method for determining current oxygen loading (mO2) of a 3-way catalytic converter (6) of a lambda-controlled internal combustion engine (1) having a linear pre-converter lambda probe (5) connected upstream of the catalytic converter, a post-converter lambda probe (7) connected downstream of the catalytic converter, and a device (9) for measuring the air-mass flow rate wherein
- a value for current oxygen loading (mO2) is calculated from the signal of the pre-converter lambda probe (5) and the measured air-mass flow rate through integration over time,
- and said value is set to 0 if the post-converter lambda probe's signal breaks through to rich mixtures.

2. The method as claimed in claim 1 wherein the value for current oxygen loading (mO2) is calculated using the formula

$$mO2 = [O2]_{air} \int_0^t \left(1 - \frac{1}{\lambda}\right) \dot{m}L \, dt,$$

where mO2 is the current oxygen loading, λ is the pre-converter lambda probe's signal, $\dot{m}L$ is the air-mass flow rate, and $[02]_{air}$ is the mass component of oxygen in air.

3. The method as claimed in one of the preceding claims wherein a value for the oxygen storage capacity (mO2_max) of the catalytic converter (6) is adapted based on the difference between oxygen loading (mO2) determined when the post-converter lambda probe's signal breaks through to lean mixtures and a previous adapted value for the oxygen storage capacity.

4. The method as claimed in one of the preceding claims wherein the value for oxygen loading (mO2) is set to the oxygen storage capacity (mO2_max) when the post-converter lambda probe's signal breaks through to lean mixtures.

5. The method as claimed in claim 3 or 4 wherein the current oxygen quotient (qO2) is calculated from the quotient of the catalytic converter's current oxygen loading (mO2) and oxygen storage capacity (mO2_max).

6. A method for regulating, controlling, and/or monitoring the exhaust treatment of a lambda-controlled internal combustion engine (1) having a 3-way catalytic converter (6), a linear pre-converter lambda probe (5) connected upstream of the catalytic converter, a post-converter lambda probe (7) connected downstream of the catalytic converter, and a device (9) for measuring the air-mass flow rate, which method uses values for

- the catalytic converter's current oxygen loading (mO2),
- the catalytic converter's oxygen storage capacity (mO2_max), and/or
- the current oxygen quotient (qO2)

that have been calculated using the method as claimed in one of the preceding claims.

7. The method as claimed in claim 6 for diagnosing the catalytic converter (6) wherein

- oscillating of oxygen loading of the catalytic converter (6) with an amplitude above maximum oxygen loading in standard operation is produced during diagnosing through forced activation,
- with a defect in the catalytic converter (6) being diagnosed if the oscillation characteristics of the signal of the post-converter lambda probe (7) are outside a target range,
- and with the oxygen quotient (qO2) being set prior to the start of diagnosing to a predetermined target value, in particular to 50%, necessary for diagnosing.

8. The method as claimed in claim 6 or 7 for monitoring the

ageing of the catalytic converter (6) wherein
- the adapted value for the oxygen storage capacity (mO2_max) of the catalytic converter (6) is compared with a predetermined threshold value and
- the diagnostic method as claimed in claim 6 will be implemented if the maximum oxygen storage capacity (mO2_max) is below the threshold value.

9. The method as claimed in claim 6 for controlling rinsing of the catalytic converter (6) after an overrun fuel-cutoff phase wherein
- a target value for the oxygen quotient (qO2) after an overrun fuel-cutoff phase is pre-specified,
- the oxygen quotient is controlled to the target value by the internal combustion engine's lambda controller after an overrun fuel-cutoff phase.

10. The method as claimed in claim 6 for regulating the exhaust treatment of a lambda-controlled internal combustion engine wherein the lambda controller is set in such a way that the oxygen quotient (qO2) is controlled to a target value, in particular to a target value of 50%.

11. The method as claimed in claim 6 for regulating and/or controlling the exhaust treatment of a lambda-controlled internal combustion engine wherein the lambda controller's controlling and regulating interventions are performed taking account of current oxygen loading (mO2), with
- a provided controlling or regulating intervention for making the mixture leaner not taking place if the oxygen quotient (qO2) is above a predetermined first threshold value; and
- a provided controlling or regulating intervention for making the mixture richer not taking place if the oxygen quotient (qO2) is below a predetermined second threshold value.